

WHAT IS CLAIMED IS:

1. A method for allocating bandwidth within a network domain by a network server operably coupled to a network domain edge node, comprising:
  - providing a database operably coupled to the network server, the database including path-level data and link-level data for a path within the network domain;
  - receiving by the network server from the network domain edge node a flow request for the path; and
  - satisfying by the network server the flow request using the link-level data if the network server determines the network server cannot satisfy the flow request using the path-level data.
2. The method of claim 1, wherein the path-level data includes unused bandwidth allocated to the path and a path state, the method further comprising satisfying by the network server the flow request using the unused bandwidth if the path is not in a critical state and the path has enough unused bandwidth to satisfy the flow request.
3. The method of claim 2, wherein the link-level data further includes quotas of bandwidth available to a link, the method further comprising allocating by the network server to each link along the path a quota of bandwidth from the quotas of bandwidth available to the link if the path does not have enough unused bandwidth to satisfy the flow request.
4. The method of claim 3, wherein the link-level data further includes a link state and the path-level data further includes a set of critical links along the path, the method further comprising allocating by the network server

bandwidth to each link in the set of critical links from unused bandwidth reclaimed from another path on each link.

5. A method for allocating bandwidth within a network domain by a distributed network server, the distributed network server including a central network server and a plurality of edge network servers, comprising:

providing a plurality of path-level databases operably coupled to the plurality of edge network servers, the path-level database including path-level data for paths within the network domain;

providing a link-level database operably coupled to the central network server, the link-level database including link-level data for links along the paths within the network domain;

receiving by the distributed network server from a network domain edge node operably coupled to an edge network server a flow request for a path within the network domain; and

satisfying by the distributed network server the flow request using the link-level data if the network server determines the distributed network server cannot satisfy the flow request using the path-level data.

6. The method of claim 5, wherein the path-level data includes unused bandwidth allocated to the path and a path state, the method further comprising satisfying by the edge network server the flow request using the unused bandwidth if the path is not in a critical state and the unused bandwidth is sufficient to satisfy the flow request.
7. The method of claim 6, wherein the link-level data further includes quotas of bandwidth available to a link, the

method further comprising allocating by the central network server to each link along the path a quota of bandwidth from the quotas of bandwidth available to the link if the path does not have enough unused bandwidth to satisfy the flow request.

8. The method of claim 7, wherein the link-level data further includes a link state and the path-level data further includes a set of critical links along the path, the method further comprising allocating by the central network server bandwidth to each link in the set of critical links from unused bandwidth reclaimed from another path on each link.
9. The method of claim 7, the method further comprising rejecting by the edge network server the flow request if a link along the path does not have a quota of bandwidth available to the link for satisfying the flow request
10. A data processing system adapted to allocate bandwidth within a network domain, comprising:
  - a database including path-level data and link-level data for a path within the network domain;
  - a processor; and
  - a memory operably coupled to the processor and having program instructions stored therein, the processor being operable to execute the program instructions, the program instructions including:
    - receiving from a network domain edge node a flow request for the path; and
    - satisfying the flow request using the link-level data if the flow request cannot be satisfied using the path-level data.

11. The data processing system of claim 10, wherein the path-level data includes unused bandwidth allocated to the path and a path state, the program instructions further including satisfying the flow request using the unused bandwidth if the path is not in a critical state and the path has enough available unused bandwidth to satisfy the flow request.
12. The data processing system of claim 11, wherein the link-level data further includes quotas of bandwidth available to a link, the program instructions further including allocating to each link along the path a quota of bandwidth from the quotas of bandwidth available to the link if the path does not have enough unused bandwidth to satisfy the flow request.
13. The data processing system of claim 12, wherein the link-level data further includes a link state and the path-level data further includes a set of critical links along the path, the program instructions further including allocating bandwidth to each link in the set of critical links from unused bandwidth reclaimed from another path on each link.
14. A computer readable media embodying program instructions for execution by a computer, the program instructions adapting a computer to allocate bandwidth within a network domain, program instructions comprising:
  - accessing a database including path-level data and link-level data for a path within the network domain;
  - receiving from a network domain edge node a flow request for a path; and

satisfying the flow request using the link-level data if the flow request cannot be satisfied using the path-level data.

15. The computer readable medium of claim 14, wherein the path-level data includes unused bandwidth allocated to the path and a path state, the program instructions further comprising satisfying the flow request using the unused bandwidth if the path is not in a critical state and the path has enough unused bandwidth to satisfy the flow request.
16. The computer readable medium of claim 15, wherein the link-level data further includes quotas of bandwidth available to a link, the program instructions further comprising allocating to each link along the path a quota of bandwidth from the quotas of bandwidth available to the link if the path does not have enough unused bandwidth to satisfy the flow request.
17. The computer readable medium of claim 16, wherein the link-level data further includes a link state and the path-level data further includes a set of critical links along the path, the program instructions further comprising allocating bandwidth to each link in the set of critical links from unused bandwidth reclaimed from another path on each link.
18. A method for allocating bandwidth within a network domain by a bandwidth broker operably coupled to a network domain edge node, comprising:

providing a network QoS state database operably coupled to the bandwidth broker, the network QoS state database including:

path-level data for a path within the network domain, including:

unused bandwidth allocated to the path;  
a set of critical links along the path; and  
a path state; and

link-level data for links along the path, including:

quotas of bandwidth available to a link; and  
a link state;

receiving by the bandwidth broker from the network domain edge node a flow request for the path;

satisfying by the network server the flow request using the unused bandwidth if the path is not in a critical state and the path has enough unused bandwidth to satisfy the flow request;

allocating by the network server to each link along the path a quota of bandwidth from the quotas of bandwidth available to the link if the path is not in a critical state and the path does not have enough unused bandwidth to satisfy the flow request; and

allocating by the network server bandwidth to each link in the set of critical links from unused bandwidth reclaimed from a another path on each link if the path is in a critical state.